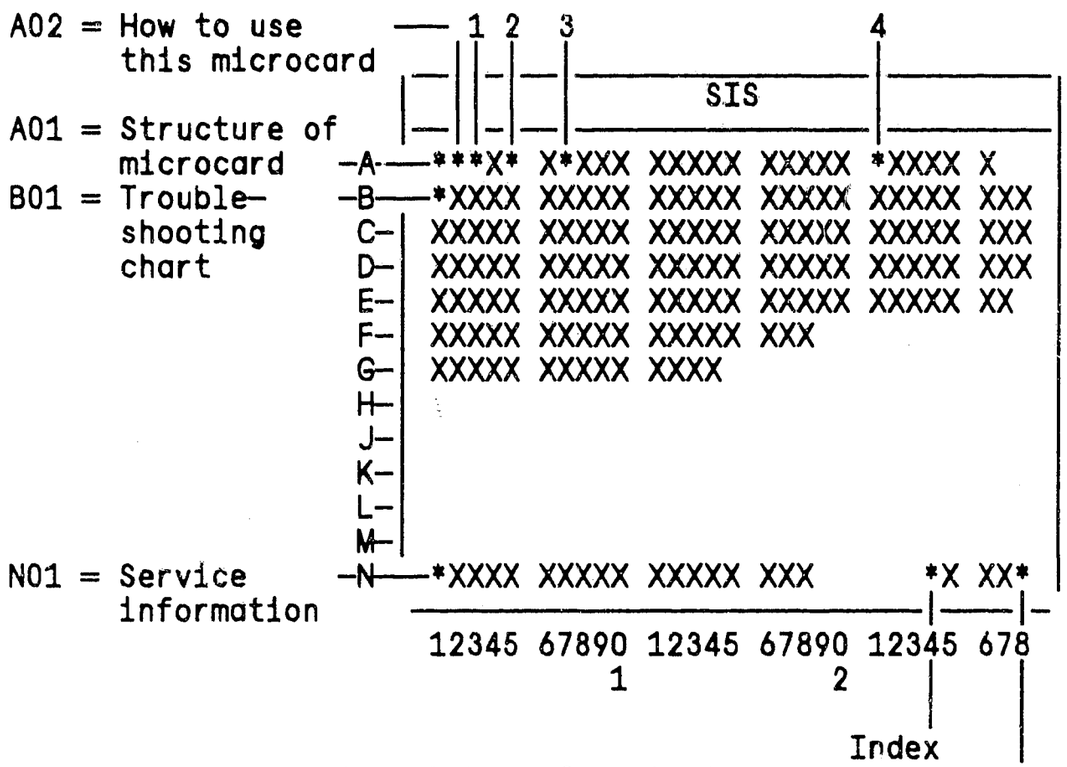
STRUCTURE OF THIS MICROCARD (BASIC INSTRUCTIONS)

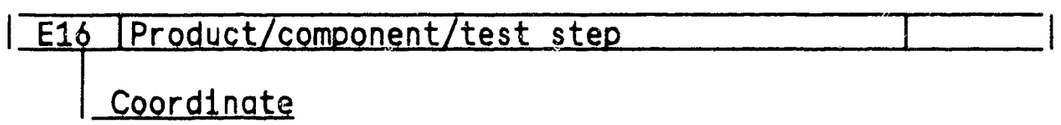


N28 = Table of contents and publication information

1 = Special features
2 = Safety and precautionary measures
3 = Test equipment and tools
4 = Installation position of components

a. Read from left to right.

b. Title of micropicture (appears on each micropicture).



c. Limits of section

HOW TO USE THIS MICROCARD

Trouble-shooting instructions for system:

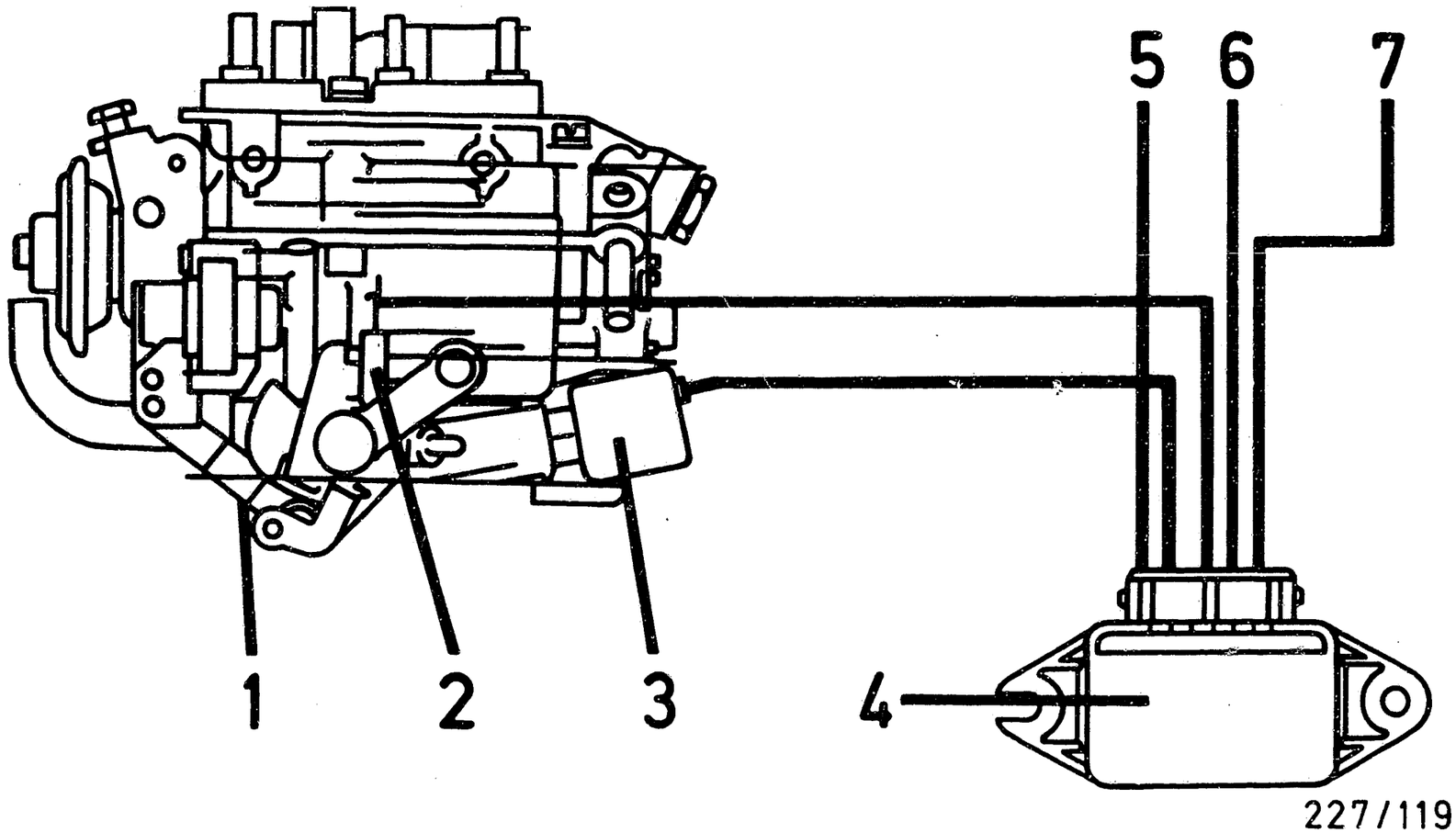
TI-I

Descriptions, photographs, terminal designations and special features refer to the following vehicle:

OPEL Corsa-A
1.2 l /4-cyl. engine E 12 GV 9.86 ->

These basic instructions are comprehensive trouble-shooting instructions. They must not be used as vehicle-specific instructions. Caution! Descriptions and photographs may deviate from the vehicle-specific brief instructions.

Mandatory set values, terminal assignments and special features should be taken from the vehicle-specific brief instructions only. For brief instructions, see table of contents Microcard KFZ-00..



227/1195

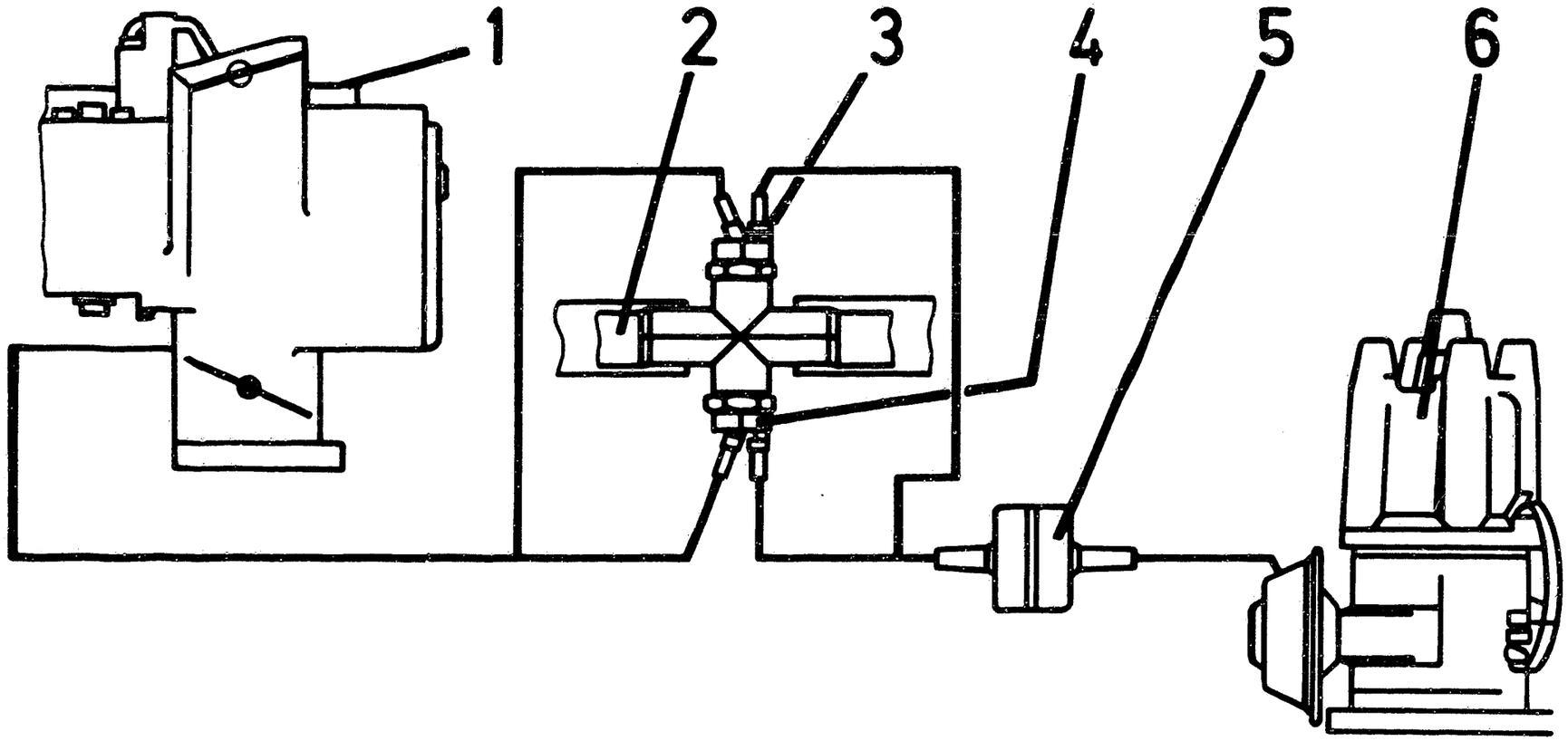
1= Carburetor 2= Throttle-valve switch - idle 3= Overrun cutoff valve 4= Engine-speed relay
5= Voltage supply term. 15 6= Ground 7= Engine-speed signal term. 1

SPECIAL FEATURES

Overrun cutoff function

The system consists of an overrun cutoff valve, which is screwed in at the carburetor in place of the idle cutoff valve, a throttle-valve switch and an engine-speed relay. The throttle-valve switch detects the throttle-valve positions "open" and "closed". The engine-speed relay detects the engine speed via term. 1 and actuates the overrun cutoff valve. If the engine-speed relay is informed that the throttle valve is closed (throttle-valve switch to ground) and that the engine speed is in excess of 1600 min^{-1}, the mixture outlet is sealed off by the overrun cutoff valve. The mixture outlet is opened up again should the speed drop below 1600 min^{-1} or if the throttle-valve switch opens.
Switching off the engine interrupts the voltage supply to the overrun cutoff valve and seals the mixture outlet, thus corresponding to the function of the idle cutoff valve.

A03 ⟹
A04 ⟺



227/1196

1= Carburetor 2= Heating circuit 3= Temperature switch (< 17° C open or > 17° C closed)
4= Temperature switch (< 50° C closed or > 50° C open) 5= Time-delay valve
6= Ignition distributor

SPECIAL FEATURES (CONTINUED)

Temperature-dependent vacuum-advance-unit cutout

At coolant temperatures between 17° C and 50° C the vacuum line from the carburetor to the advance unit of the ignition distributor is closed off by means of a temperature switch with the result that there is no vacuum advance of the ignition point.

At coolant temperatures < 17° C or > 50° C a time-delay valve applies vacuum to the vacuum advance unit, with the result that the vacuum advance is adjusted in the event of dynamic processes. The delay times are a function of the pressure difference upstream and downstream of the time-delay valve.

For production reasons:
continued on the following
coordinate.

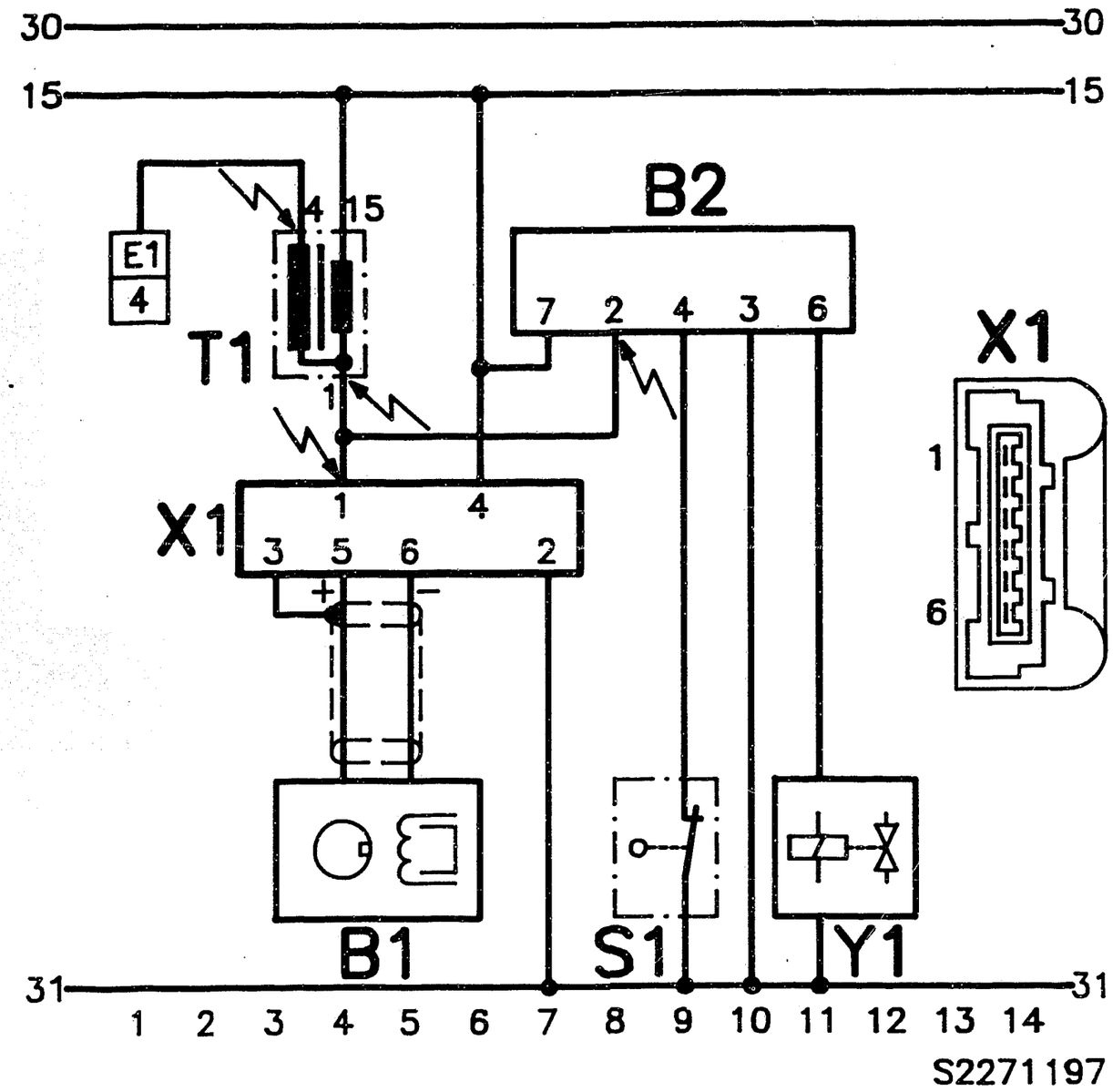
SAFETY AND PRECAUTIONARY MEASURES

Be sure to observe safety and precautionary measures so as to avoid risk to persons and to prevent damage to the engine, trigger boxes, control units or the ignition system.

CAUTION!
High-energy ignition system with dangerous high and low voltages!

Touching live parts or terminals may be highly dangerous (both on the primary and secondary sides).

In this connection we should like to point out that VDE Regulations (in particular VDE 0104/7.67) and the pertinent local regulations are to be adhered to when performing work on or testing the ignition system.



High-tension arrows: caution 400 V...25 kV

T1 = Ignition coil

X1 = Trigger-box plug

SAFETY AND PRECAUTIONARY MEASURES (CONTINUED)

The hazardous locations are marked with high-tension arrows taking the terminal diagram of an electronic ignition system as an example.

Never start engine without battery securely connected (battery terminals tightened).
Do not disconnect battery from vehicle electrical system with engine running.

Do not use a fast charger for starting the engine.
Provide starting assistance only with second 12 V battery and jump leads.
Caution! Owing to non-standardized requirements of vehicle manufacturers with regard to electronic products, we advise against using a 24 V battery for starting assistance.

When charging the battery in the vehicle or providing starting assistance, follow the operating instructions for the fast charger as well as instructions of the vehicle manufacturer.

Disconnect battery from vehicle electrical system before charging or fast-charging.

Incorrect polarity of the supply voltage, e.g. through incorrect connection of the battery or ignition coil, may lead to the destruction of a control unit.

Do not connect or disconnect wiring-harness plugs from control units or trigger boxes with the ignition on.

Remove control units at temperatures above + 80° C (paint-drying installation).

Remove control units before carrying out electric welding work.

When testing compression, detach trigger-box plug or p e r m a n e n t l y connect ignition coil term. 4 to ground with auxiliary cable (hazardous high tension, insulation damage on ignition coil, ignition distributor, ignition harness).
N o t e :
Auxiliary cable must feature at least 2 k Ω interference suppression, e.g. sleeve-type suppressor (5 k Ω) 0 356 500 001.

Prescribed ignition coil (see part no.) is not to be replaced with a different ignition coil.

An interference-suppression capacitor is not to be connected to term. 1 of the ignition coil.

The positive terminal of the battery is never to be connected to term. 1 of the ignition coil as this will destroy the trigger box.

Do not short-circuit term. 1 of ignition coil to ground (e.g. to switch off engine), as this will destroy the ignition coil and possibly also the trigger box.

Ignition cable from ignition coil and ignition distributor term. 4 must not be detached during operation.

There must be no voltage flashover from term. 4 of the ignition coil to term. 1 and term. 15 of the ignition coil.

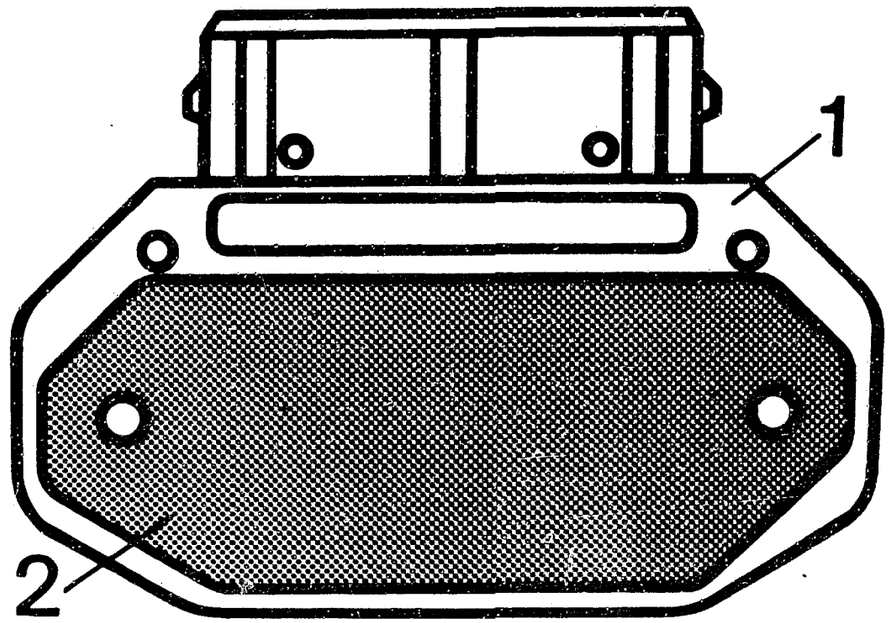
The secondary side of the ignition system must feature at least 2 k Ω interference suppression, so as to prevent destruction of the trigger box. The original distributor rotor must be fitted with 1 k Ω .

SAFETY AND PRECAUTIONARY MEASURES
(CONTINUED)

Incorrect indication of engine speed, dwell angle and ignition point:

With this ignition system (trigger box with current limitation) there is a possibility of an incorrect indication of engine speed, dwell angle and ignition point on testers.

Refer to coordinates N10...N17 for more detailed information



227/092

1 = Trigger box

2 = Base

SAFETY AND PRECAUTIONARY MEASURES
(CONTINUED)

The base must be coated with thermal conduction compound before installing the trigger box.

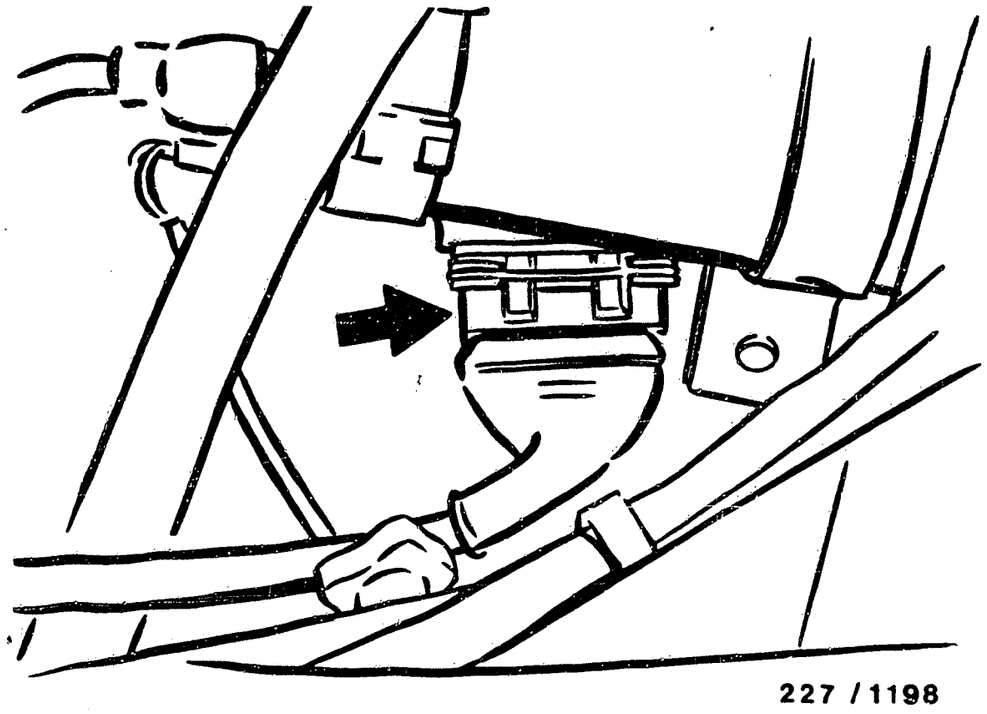
Only apply thermal conduction compound with a suitable implement (screwdriver, match etc.).
Do not apply thermal conduction compound to painted parts.

TESTERS AND TOOLS

Motortester e.g. Mot 206	0 684 000 206
Pulse-shaping circuit (required for measuring primary voltage with MOT 201, 206 and 400)	1 684 463 154
TDC sensor (OHC engine only)	1 687 224 633 .. 655
Sleeve-type suppressor 5 k Ω	0 356 500 001
Ohmmeter ETE 014.00 or e.g. Pontavi Wh 2	0 684 101 400 Commercially available
Voltmeter e.g. ETE 014.00	0 684 101 400
Test leads (for proper connection of testers to connectors)	KDZS 0004 KDZS 0005
Black test prod Red test prod (for proper connection of testers to connectors)	1 684 485 034 1 684 485 035
Connecting cable for ignition coil (for term. 1 green)	1 684 443 055
Connecting cable for ignition coil (for term. 15 yellow)	1 684 443 054

TESTERS AND TOOLS (CONTINUED)

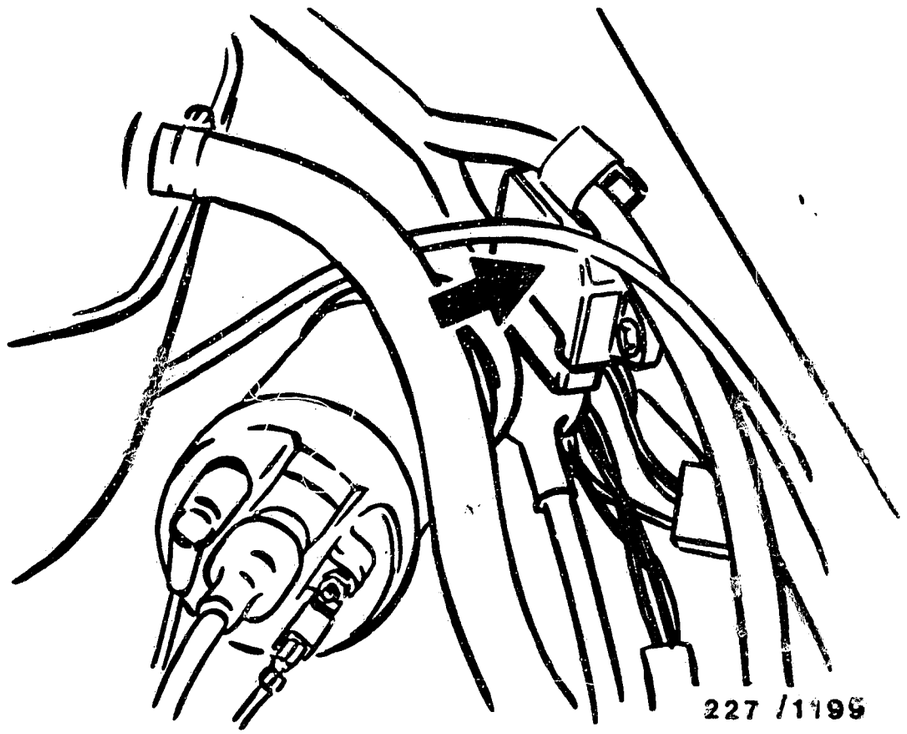
Thermal conduction compound	5 942 860 003



Arrow = Trigger box

INSTALLATION POSITION OF COMPONENTS

The trigger box and ignition coil are located at the wheel house, front left.



Arrow = Engine-speed relay (overrun cutoff)

INSTALLATION POSITION OF COMPONENTS (CONTINUED)

The engine-speed relay is located at the wheel house, front left.

HOW TO USE TROUBLE-SHOOTING CHART AND TROUBLE-SHOOTING PROGRAM

The TROUBLE-SHOOTING CHART starts on Coordinate B04 and contains customer complaint (fault symptom) with several possible causes (component faults) in each case as well as coordinate references for detailed trouble-shooting. If no coordinate reference is given, it is a cause for which test instructions are not required.

If the customer complaint is clear, proceed with trouble-shooting in the given order of possible causes, one after the other and step by step.

Trouble-shooting should always start with the self-diagnosis (if available) or with the universal test adapter (if provision is made). Only then continue with the trouble-shooting chart.

If the customer complaint is not clear, check all the causes given in the trouble-shooting chart. In order to prevent possible incorrect measurements, check all causes in the order given (because of the interlinking of test steps).

HOW TO USE TROUBLE-SHOOTING CHART AND TROUBLE-SHOOTING PROGRAM (CONTINUED)

The TROUBLE-SHOOTING PROGRAM contains all system and component checks mentioned in the trouble-shooting chart. It is divided into three rows of boxes.

The left-hand column contains test instructions and set values.
The center column contains instructions on trouble-shooting and fault rectification. The right-hand column contains the illustrations/terminal diagrams belonging to the text, with explanations.

If the questions in the left-hand column can be answered clearly with "yes", continue trouble-shooting with the next box down.

If the answer to the question is "no", branch to the center column and carry out the tests in the order given there.
After the fault has been rectified, repeat the test as a check.

HOW TO USE TROUBLE-SHOOTING CHART AND TROUBLE-SHOOTING PROGRAM (CONTINUED)

TEST CONDITIONS:

- Battery fully charged
- Engine mechanically O.K. (e.g. compression, valve clearance etc.)
- Engine at operating temperature approx. +80°C (if necessary)
- All connectors of wiring harness correctly seated

TROUBLE-SHOOTING CHART

Customer complaint (fault symptoms)

1. Starting motor operates, engine fails to start or starts only with difficulty.	2. Engine starts but then dies.	3. Idle problems (engine speed, exhaust gas).	4. Poor throttle take-up, flat spot during acceleration.	5. Engine missing (ignition, injection).	6. Maximum engine power/top speed not reached.	7. Fuel consumption too high.	8. Engine running on.	9. Engine pinging/knocking.	10. Engine overheating.	Cause (component fault)	Coord.
*				*						High-tension side	B07
*										Firing sequence	—
*				*						Ignition coil	B09
*										Voltage, trigger box	B11
*										Voltage, primary circuit	B13
*										Mechanical damage Magnetic pulse generator	B15
*										Internal resistance, magnetic pulse generator	B17
*										Insulation, magnetic pulse generator	B19
*										Voltage - polarity, magnetic pulse generator	B21
*										Contact resistance (primary side)	B23
*										Primary signal	B27
*		*	*		*	*		*	*	Ignition point and advance	C01

TROUBLE-SHOOTING CHART (CONTINUED)

Customer complaint (fault symptoms)

1. Starting motor operates, engine fails to start or starts only with difficulty.	2. Engine starts but then dies.	3. Idle problems (engine speed, exhaust gas).	4. Poor throttle take-up, flat spot during acceleration.	5. Engine missing (ignition, injection).	6. Maximum engine power/top speed not reached.	7. Fuel consumption too high.	8. Engine running on (dieseling).	9. Engine pinging/knocking.	10. Engine overheating.	Cause (component fault)	Coord.
			*							Voltage, trigger box (engine idling)	C03
			*							Voltage, ignition coil (engine idling)	C05
*										Peak-coil-current cutoff	C07
				*						Primary voltage (engine idling)	C09

For production reasons: continued on the following coordinate.

TROUBLE-SHOOTING PROGRAM (1)

V

Test high-voltage side.

Test spark plugs, spark-plug connectors, suppression resistors, H.T. ignition cables, distributor cap, distributor rotor etc. for proper operation (e.g. open circuit, shunt).

Assessment e.g. through ignition oscillogram, resistance measurements and visual check.

High-voltage side O.K.?

N> Repair high-voltage side.

Y

V

Return to trouble-shooting chart B04

B07 — ==>

B08 — <==>

TROUBLE-SHOOTING PROGRAM (2)

V

Check ignition coil

Visual examination:

Remove protective cap from ignition coil and check whether plug is in position and whether sealing compound has escaped.
See picture.

Electrical check:

Ignition coil primary term. 15 and term. 1

(Take resistance of test lead and test prods into account)

Set value: see brief instructions

Ignition coil secondary term. 1 and term. 4

Set value: see brief instructions

Visual examination O.K./set value obtained?

N>

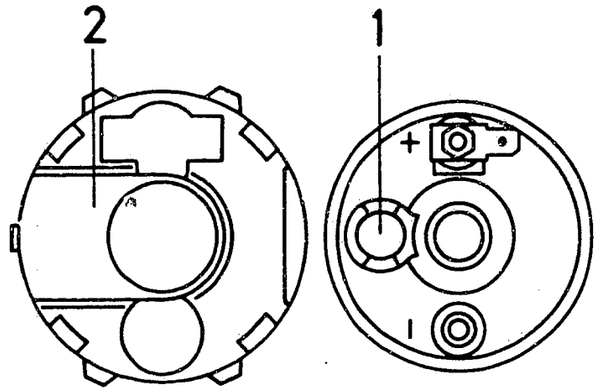
1. Renew trigger box and ignition coil if there is no plug present or if sealing compound has leaked out.

2. Renew ignition coil if set values are not O.K.

Y

V

Return to trouble-shooting chart B04



227/0055

1 = Plug
2 = Protective cap

B09 — <==>

B10 — <==>

TROUBLE-SHOOTING PROGRAM (3)

V

Test trigger-box voltage.

Detach trigger-box plug and connect voltmeter to term. 4 (+) and term. 2 (-).
See picture.

Switch on ignition.

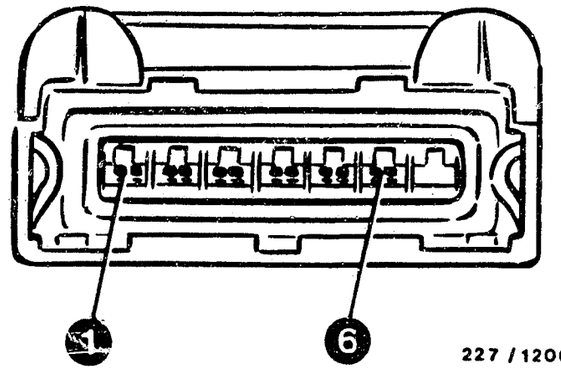
Set value: battery voltage

Is set value attained?

N>

Check for open circuit in leads and connections between ignition/ starting switch and trigger-box plug term. 4 including ground lead term. 2.

Eliminate open circuit.



227 / 1200

Y

V

Return to trouble-shooting chart B04

B11 — <==>

B12 — <==>

TROUBLE-SHOOTING PROGRAM (4)

V

Test primary-circuit voltage.

Detach trigger-box plug and connect voltmeter to term. 1 (+) and term. 2 (-).
See picture.

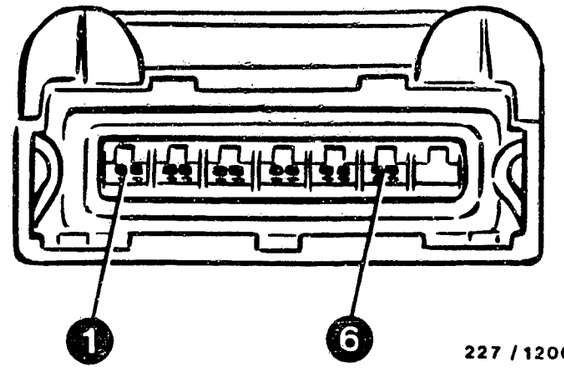
Switch on ignition.

Set value: battery voltage

Is set value attained?

N>

Test for open-circuit in lead from ignition and starting switch to ignition coil term. 15, primary winding of ignition coil and lead from ignition coil term. 1 to trigger-box plug term. 1 including ground lead term. 2.
Eliminate open-circuit.



227 / 1200

Y

V

Return to trouble-shooting chart B04

B13 — <==>

B14 — <==>

TROUBLE-SHOOTING PROGRAM (5)

Check for mechanical damage in magnetic pulse generator.

Visual inspection: timer core must not catch on teeth of magnetic pulse generator.

Magnetic pulse generator O.K.?

N> Replace magnetic pulse generator/ ignition distributor.

Y

Return to trouble-shooting chart B04

TROUBLE-SHOOTING PROGRAM (6)

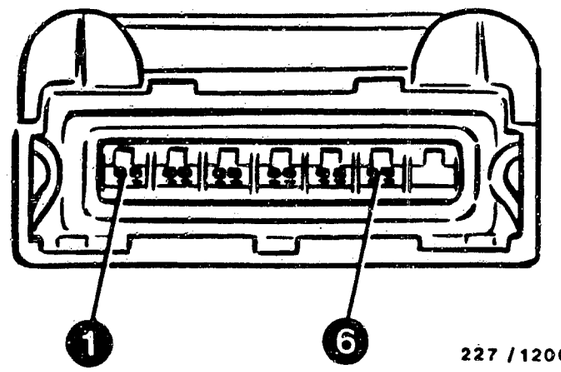
Test internal resistance of magnetic pulse generator.

Detach trigger-box plug and connect ohmmeter to term. 5 and term. 6. See picture.

Set value: see brief instructions

Is set value attained?

N> Renew magnetic pulse generator/ ignition distributor or lead.



227 /1200

Return to trouble-shooting chart B04

TROUBLE-SHOOTING PROGRAM (7)

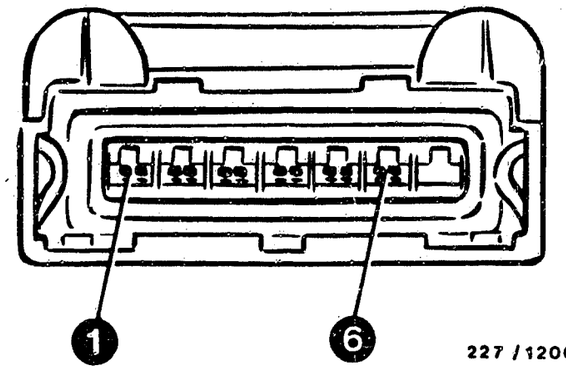
Test insulation of magnetic pulse generator.

Detach trigger-box plug and connect ohmmeter to term. 5 and vehicle ground.
See picture.

Set value: infinity Ω

Is set value attained?

N> Renew magnetic pulse generator/ ignition distributor or lead.



227/1200

Return to trouble-shooting chart B04

B19 — <==>

B20 — <==>

TROUBLE-SHOOTING PROGRAM (8)

Test voltage – polarity of magnetic pulse generator.

Detach trigger-box plug.
Connect oscilloscope in program-selector-switch setting "special" as per operating instructions.
For example MOT 206:

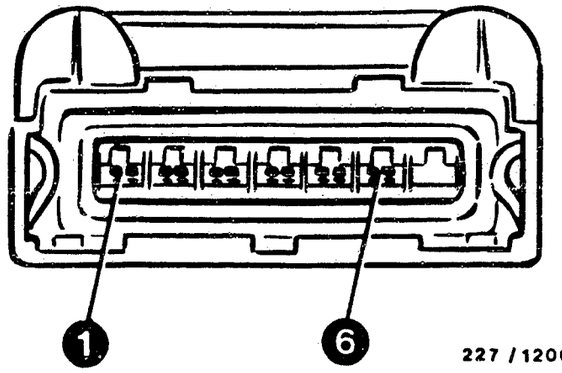
Connect red and black terminal to trigger-box plug term. 5 (+) and term. 6 (–).
See top picture.

Start engine.
Oscilloscope must indicate a voltage with correct polarity.
See bottom picture, arrow.

Set value: with correct polarity, the positive half wave starts with a shallow rise and drops off sharply to the zero crossing after reaching the peak.

Is set value attained?

N> Eliminate incorrect polarity (socket, lead).

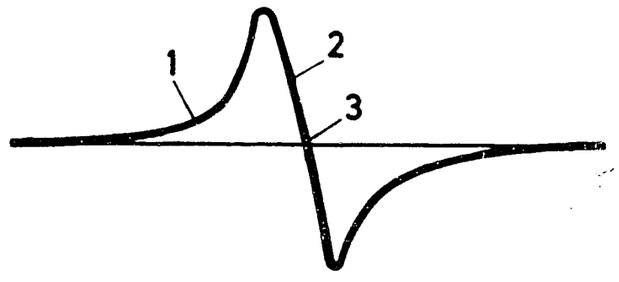


227 / 1200

Y

Return to trouble-shooting chart B04

1= Shallow rise
2= Steep fall
3= Zero crossing



227/1201

TROUBLE-SHOOTING PROGRAM (9)

Test contact resistance (primary side).

Disconnect negative and positive leads of battery.
Detach trigger-box plug.
See picture.

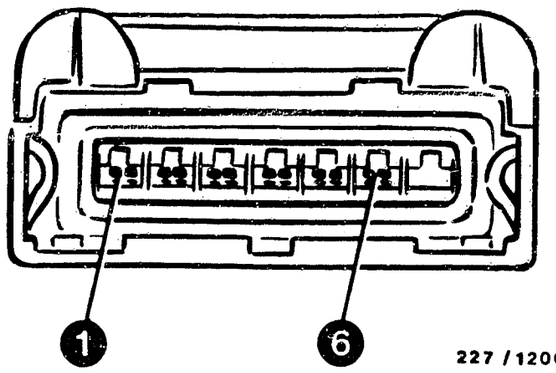
Switch on ignition.

Test for contact resistance in leads from positive battery terminal to trigger-box plug term. 4 including leads from negative battery terminal to trigger-box plug term. 2.
See picture.
(Take account of resistance of test lead/test prods).

Set value: see brief instructions

Is set value attained?

N> Eliminate contact resistance.



227 / 1200

Continued on next picture page

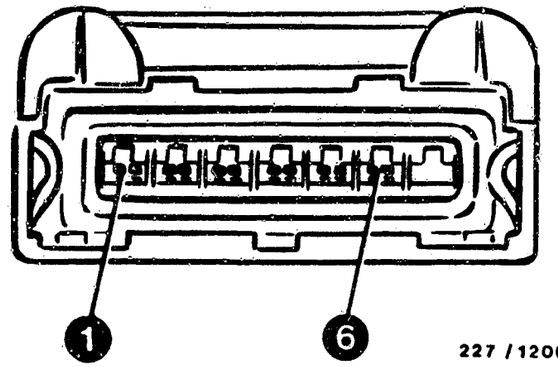
TROUBLE-SHOOTING PROGRAM (9) CONTINUED (1)

Test for contact resistance in leads from positive battery terminal to ignition coil term. 15 as well as in lead from ignition coil term. 1 to trigger-box plug term. 1.
See picture.
(Take account of resistance of test lead/test prods).

Set value: see brief instructions

Is set value attained?

N> Eliminate contact resistance.



227 /1200

Y

Return to trouble-shooting chart B04

B25 — <⟹>

B26 — <⟹>

TROUBLE-SHOOTING PROGRAM (10)

V

Test primary signal.

Trigger-box plug connected.

Primary signal with oscilloscope

Connect oscilloscope as per operating instructions to ignition coil term. 15 (+) and term.1 (-).

Start engine.

Set value:
Oscilloscope must indicate a primary voltage (of any magnitude). See picture.

O R

Primary signal with engine-speed tester

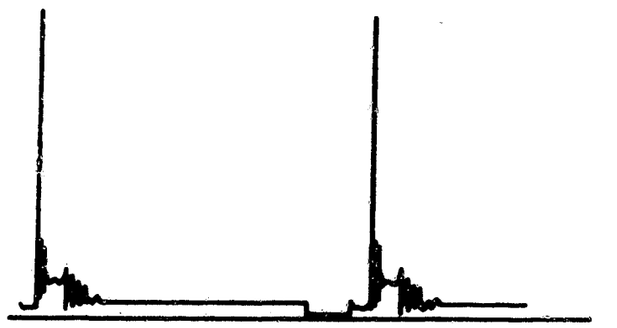
Connect engine-speed tester as per operating instructions to ignition coil term. 15 (+) and term. 1 (-).

Start engine.

Set value:
Engine-speed tester must indicate a value (irrespective of magnitude).

Primary signal present?

N> Renew trigger box.



227/1100

Y

V

Return to trouble-shooting chart B04

TROUBLE-SHOOTING PROGRAM (11)

V

Test ignition point and advance.

Connect Motortester as per operating instructions.

Set value: see test specifications (e.g. Autodata)

Is set value attained?

N> Adjust ignition point, renew defective parts.

Y

V

Return to trouble-shooting chart B04

C01 — <⟹>

C02 — <⟹>

TROUBLE-SHOOTING PROGRAM (12)

Test trigger-box voltage.

Push back rubber sleeve of trigger-box plug and connect voltmeter to term. 4 (+) and term. 2 (-).
See picture.

Allow engine to idle.

Set value: 12..14 V or a maximum of 1 V below battery voltage.

Is set value attained?

N>

Disconnect negative and positive lead of battery.
Detach trigger-box plug.
Switch on ignition.

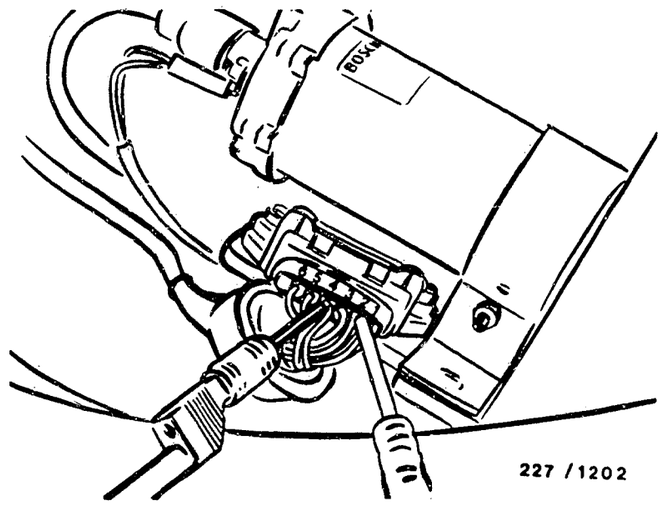
Check for contact resistance in following leads:

1. From battery negative terminal to trigger-box plug term. 2

2. From positive battery terminal to trigger-box plug term. 4

Contact resistance during testing of items 1 and 2 max. 0.3 Ω
(take account of resistance of test prods/test lead).

Eliminate contact resistances.



Return to trouble-shooting chart B04

C03 — <==>

C04 — <==>

TROUBLE-SHOOTING PROGRAM (13)

V

Test ignition-coil voltage.

Connect voltmeter to ignition coil term. 15 (+) and battery negative terminal (use connecting cable for ignition coil).

Allow engine to idle.

Set value: at least 10 V

Is set value attained?

N>

Disconnect positive lead from battery; switch on ignition.

Check for contact resistance in leads between positive battery terminal and ignition coil term.15.

Contact resistance may be max. 0.3 Ω (take resistance of test prods and test leads into account)

Eliminate contact resistance.

Y

V

Return to trouble-shooting chart B04

C05 — <⟹>

C06 — <⟹>

TROUBLE-SHOOTING PROGRAM (14)

Test peak-coil-current cutoff.

Connect voltmeter to ignition coil term. 15 (+) and term. 1 (-).

Switch on ignition.

Set value: voltmeter may briefly deflect for approx. 1 s.
Voltmeter must return to 0 V.

Is set value attained?

N> Replace trigger box and ignition coil.

Y

Return to trouble-shooting chart B04

C07 — <⟹>

C08 — <⟹>

TROUBLE-SHOOTING PROGRAM (15)

Test primary voltage.
(If MOT series present)

N> Replace trigger box.

Connect oscilloscope (e.g. MOT 206) together with pulse-shaping circuit 1 684 463 154 to ignition coil as per operating instructions.

N o t e :

Incorrect measured value without pulse-shaping circuit.

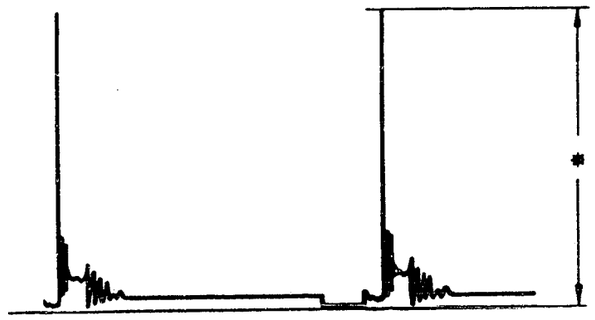
Allow engine to idle.

Set value: see picture/brief instructions

Is set value attained?

Y

Return to trouble-shooting chart B04



227/957

* = See brief instructions

C09 — <==>

C10 — <==

T E C H N I C A L B U L L E T I N

|22|

DANGER OF ACCIDENT ON SEMI-CONDUCTOR IGNITON SYSTEMS

VDT-I-227/102 En
03.1981

Supersedes Feb. 3, 1976 edition

Please be sure to pass this bulletin together with VDE 0104/7.67 enclosed on to your employees for their attention.

The increased demands made on their ignition systems by modern engines, and the wish for freedom from maintenance, led some time ago to manufacturers starting to equip their vehicles with semi-conductor ignition systems as original equipment.
In most cases, the performance of nearly all makes of such systems is higher than that of conventional systems, and further improvements are to be expected. This means that semi-conductor ignition systems have reached the point where contact with "live" components or terminals (whether on the primary side or the secondary side) can prove fatal.

In this connection, we should like to point out to you that the laws valid in your country regarding work on high-voltage systems must be adhered to when working on, or testing, semi-conductor ignition systems.

As a matter of principle, when working on such ignition systems, the ignition is to be switched off.
Included in such work are the following operations:

* Connection of engine testing equipment (timing strobe, dwell-tach tester, ignition oscilloscope etc.)
* Replacement of ignition system components (spark plugs, ignition coil, ignition distributor, H.T. ignition cables etc.)

If it is necessary to switch on the ignition in order to test the system or make adjustments on the engine (to the carburetor, for instance), then lethal voltages are present throughout the entire system.

This means that the danger of accident exists not only at the individual components in the system (e.g. ignition distributor, ignition coil, trigger box, ignition harness), but also at the wiring harness (e.g. connection for the tachometer, diagnositc connector), on terminals, and on test equipment.

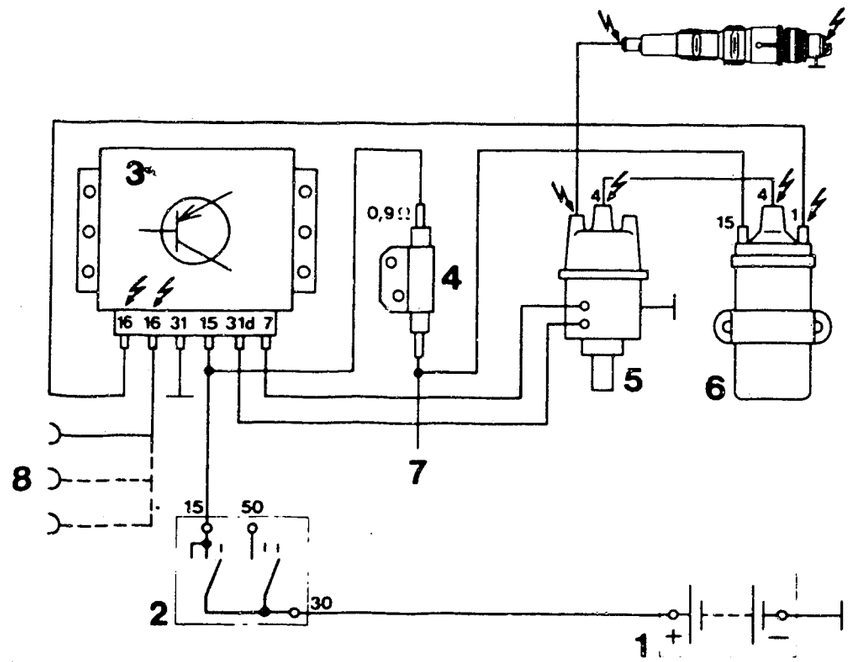
In addition, in the case of the capacitor-discharge ignition system (CDI), danger of accident is also present under the following circumstances:

* Operation of the trigger box without the ignition transformer.

* At the trigger box, (removed), relatively soon after it has been switched off (capacitor discharge).

Below is a typical terminal diagram of a semi-conductor ignition system, the dangerous locations being marked with high-voltage arrows.

We would point out that all semi-conductor ignition systems, even the older versions, are to be regarded as dangerous in the sense as defined by this bulletin.



227/a

1 = Battery
2 = Ignition/starting switch
3 = Trigger box
4 = Resistor
5 = Ignition distributor
6 = Ignition coil
7 = to starting motor term. 15a
8 = to tachometer connection
or diagnostic plug
or TD terminal

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TECHNICAL BULLETIN

EFFECTS OF ELECTRICAL AND ELECTRONIC SYSTEMS ON HEART PACEMAKERS
e.g. Ignition systems, Jetronic, Motronic, ABS

VDT-I-227/107 En
01.1981

Please ensure that this Bulletin is passed on to your employees for their attention.

We have often been asked by some of our customers whether or not patients with heart pacemakers are endangered in any way by ignition systems. This theme was recently the subject of an examination carried out by the Ignition System Development Department of Robert Bosch GmbH in conjunction with Dr. Thull, lecturer at the Central Institute for Biomedical Technology at the University of Erlangen-Nürnberg and Biotronic GmbH & Co. of Berlin, a manufacturer of heart pacemakers. The magazine "Biomedizinischen Technik" (5/80) published the results.

The most important discoveries in this practice can be summarized from the examination report as follows:

1. Heart pacemakers corresponding to the latest state of the art are not affected by radiation (electromagnetic fields) from ignition systems.

2. With a stationary engine and the ignition switched off, the heart pacemaker is not affected by any part of the ignition system, even when unintentionally touched. Maintenance work in the engine compartment, for example, can then be carried out without any danger.

3. With the engine running or stationary with the ignition switched on, touching current-carrying parts of the ignition system, as well as parts of any other electrical system, presents a certain danger for everybody. The heart pace-maker can here be affected under certain conditions (voltage, current and frequency). Patients with heart pace-makers should therefore at all costs avoid touching current-carrying parts of electrical systems.

4. Furthermore, patients with heart pace-makers are more inclined to psychic shock effects than other people, even when they receive just a harmless electric shock, because many such patients are conscious of the increased danger to the cardiac activity.

We therefore consider it inadvisable for patients with heart pacemakers to be employed in workshops or on vehicles where ignition systems are being tested or repaired. If any members of your staff have heart pacemakers, please introduce the necessary measures.

We would like to add that heart pacemakers are not expected to be affected in any way by interference from other electronic products and systems which we manufacture, such as the Antiskid System (ABS), Jetronic, Motronic, because the much greater radiation intensity of the ignition systems examined in normal use has not caused any inter-ference to heart pacemakers corresponding to the latest state of the art.

If you should receive questions on this matter from customers, please inform them accordingly.

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NEW DESIGNATIONS FOR IGNITION SYSTEMS

VDT-I-227/108 En
01.1983
Supersedes 5.1981 edition

The introduction of new ignition systems has made it necessary to reclassify all designations.

The designations listed below will be used immediately in KH workshop and sales literature.

Designation	Abbreviated code	Meaning	Switching	Ignition ctrl. and spark adv.	High-voltage dist.
Coil ignition	ZS (CI)	———	Mechanical (breaker points)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Transistorized coil ignition	TSZ-K (TCI-c)	K=breaker-triggered	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Trigger box with conventional circuit techniques	TSZ-I * (TCI-i)	I=Induction-type pulse gen.	Electronic (trigger box)	Mechanical (ignition dist.)	Mechanical (ignition dist.)
	TSZ-H (TCI-h)	H=Hall generator	Electronic (trigger box)	Mechanical (ignition dist.)	Mechanical (ignition dist.)
Transistorized ignition	TZ-I * (TI-i)	I-Induction-type pulse gen.	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
(Trigger box in hybrid technique)	TZ-H * (TI-h)	H=Hall generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Breakerless semi conductor ignition with or without knock control	EZ (EI) (EZ-K) (EI-k)	——— K= Knock control	Electronic (trigger box or control unit)	Electronic (control unit)	Mechanical (ignition distributor or high-voltage distributor)
Distributor-less ignition with or without knock control	VZ (FEI) VZ-K (FEI-k)	——— K= Knock control	Electronic (control unit)	Electronic (control unit)	Electronic (dual-spark ignition coil, or 1 ignition coil for each spark plug)

* Note:

The ignition system can also be equipped with a DLS unit (digital idle stabilization) or with an ELS unit (electronic idle stabilization) or with an ESV unit (electronic ignition retardation).

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INCORRECT DISPLAY OF ROTATIONAL SPEED AND DWELL ANGLE ONLY WITH TRIGGER BOXES 0 227 100 .. (TCI-i, TCI-h) WITH CURRENT LIMITATION

VDT-I-Gen. 030 En
C2.1981
Supersedes ed. 6.1980

For additional information, see VDT-I Gen. 032 En

1. General

In comparison with conventional ignition systems, transistorized ignition systems with current limitation have different primary voltage characteristics. During the dwell period, the voltage at terminal 1 of the ignition coil may assume values from 1.5 V to battery voltage (or greater). This may lead to an incorrect display of rotational speed and dwell angle when testing the ignition system. However, there is no functional defect in the ignition system, and, for this reason, the trigger box must not be replaced. Incorrect displays may occur with the testers listed below:

MOT 001.00	Rotational-speed	KTE 001.00
001.01	display O.K. with	001.02
001.02	these testers	001.03
001.04		
002.00		

By now, the following vehicles may be fitted with breakerless ignition systems with current limitation:

Audi	(Bosch/Fairchild ignition system)	Mazda	(Mitsubishi ignition system)
BMW	(Bosch ignition system)	Mitsubishi	(Mitsubishi ignition system)
Citroen	(Delco ignition system)	Nissan Datsun	(Hitachi ignition system)
Fiat	(Delco ignition system)	Peugeot	(Bosch ignition system)
Ford	(Delco ignition system)	VW	(Bosch/Fairchild ignition system)
General Motors	(HEI ignition system)	Bosch transistorized ignition system for retrofitting 0 227 100 920	

2. Test instructions

2.1 Rotational speed

Incorrect rotational-speed display can be recognized as follows:

If one starts at the idle speed and slowly increases the engine speed, then the incorrect display can be recognized by an abrupt reduction in the rotational-speed display (e.g. from 2400 min $^{-1}$ to 1200 min $^{-1}$).

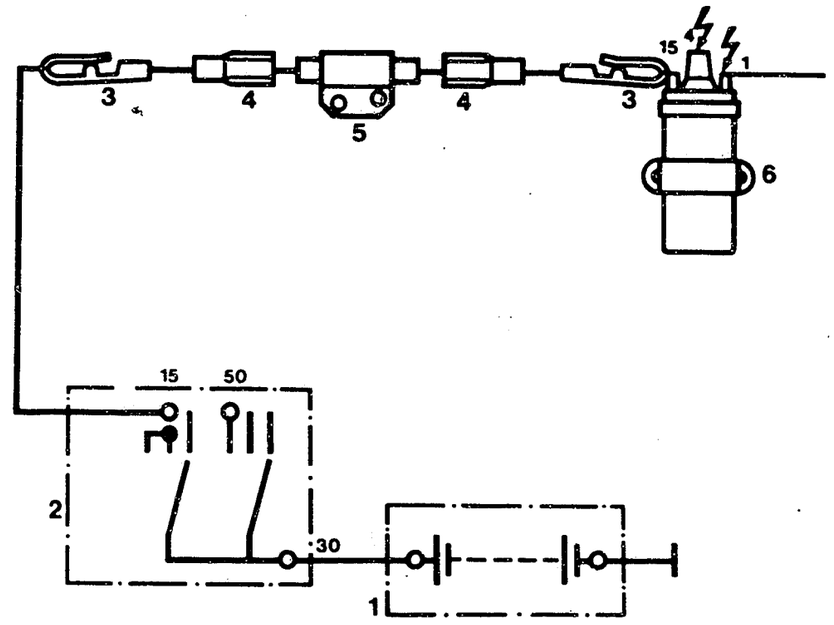
It is, however, possible to attain correct rotational-speed measurements:

Connect a ballast resistor of 0.9 or 1.0 Ohms (see Fig.) in series in the line to term. 15 of the ignition coil (take care not to cause a short circuit). After the rotational-speed measurement, the ballast resistor must be removed (otherwise starting difficulties and misfiring). Connect tester as per operating instructions.

Suggestion for user manufacture

Required parts:

1 ballast resistor 0.9 Ohms	Part no. 0 227 900 002
or	
1 ballast resistor 1.0 Ohms	Part no. 0 227 900 101
2 blade receptacles	Part no. 1 901 355 881
e.g. approx. 0.2 m cable, 1.5 mm ^{2} e.g.	Part no. 6 210 150 150
2 insulated clips	Commercially available



227/d

1 = Battery
2 = Ignition/starting switch
3 = Terminals
4 = Blade receptacle
5 = Series resistor
6 = Ignition coil

Danger arrows: Warning: 400 V...25 KV

2.2 Dwell angle

The dwell angle is electronically controlled. The dwell angle is no longer measured.

2.3 Ignition timing

Is correctly indicated. Tester connections according to operating instructions.

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After-Sales Service Department for Training and Technology (KH/VSK)
Please direct questions and comments concerning the contents to our authorized representative in your country.

MOTORTESTER CONVERSION VDT-I-Gen. 032 En
Incorrect indication of engine speed, 06.1980
dwell angle and ignition point
only with trigger boxes
0 227 100 .. (TCI-I, TCI-H) with current limitation

For additional information see
VDT-I-Gen. 030 of 06.1980
Concerns: Motortester EFAW 268
268 S 10
269
214 B
AE 2000

1. General

Please arrange for above-quoted motortesters in your workshop as well as at your customers (e.g. motor-vehicle workshops, petroleum companies, gas stations, vocational schools etc.) to be converted. Conversion is subject to payment and is performed by the K7 after-sales service of the responsible BG. The standard time is 15 work units (with installation of switch).

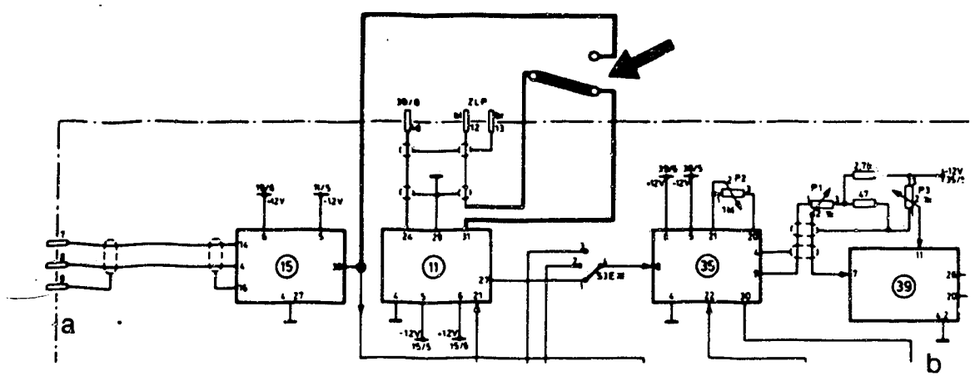
2. Why convert motortesters?

Transistorized ignition systems with current limitation have a different primary-voltage characteristic from conventional ignition systems. During the dwell period, the voltage at terminal 1 of the ignition coil may assume values between 1.5 V and battery voltage (or greater), which, when checking the ignition system, may lead to an incorrect indication of engine speed and dwell angle and to incorrect triggering of the counter.

There is, however, no functional defect in the ignition system, and, for this reason, the trigger box must not be replaced. Since, with the above-listed motortesters, the timing strobe is triggered by the signal-path dwell-angle meter, this incorrect triggering also leads to incorrect flashing and thus to an incorrect display of the advance angle.

3. Conversion measures

The situation is to be remedied by modifying the wiring of the testers so that the timing strobe is triggered by the clamp-on induction pickup and the pulse shaper stage.



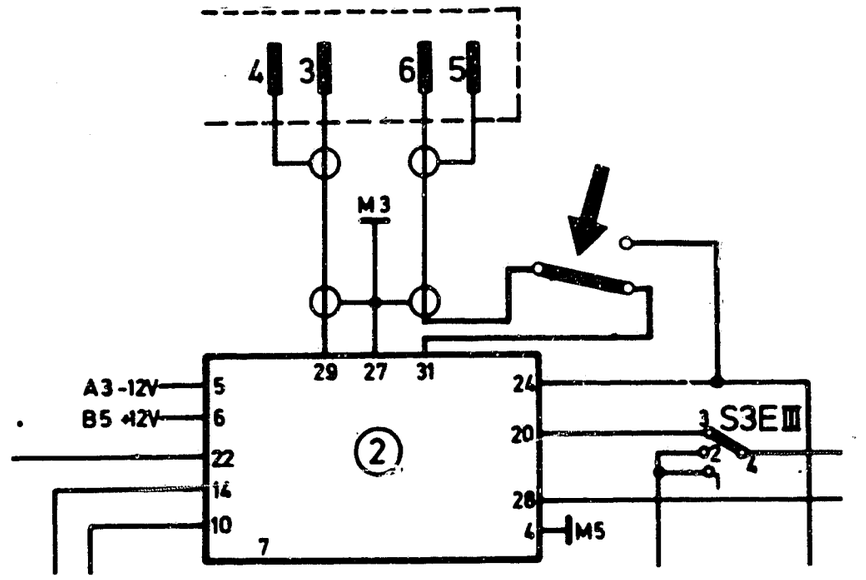
227/e

a = Clamp-on induction pickup
b = (Extract from WJF 508/1, Page 53)

EFAW 268, 268 S 10, 269, AE 2000

Remove the line of the ZLP from pin 31 of printed board 11 (coupling stage) and connect to pin 30 of printed board 15 (pulse shaper stage) via a switch with change-over contact (e.g. 0 341 500 803).

In addition, a new line must be connected from pin 31 of printed board 11 to the other contact of the switch with change-over contact.
Arrow points to switch with change-over contact.



227/f

(Extract from WJF 503/1, Page 64))

EFAW 214 B

Remove the line from terminal 6 of printed board 16 to pin 31 of printed board 2 (coupling stage) and connect to pin 24 of the same printed board via a switch with change-over contact (e.g. 0 341 500 803).

In addition, a new line must be connected from pin 31 of printed board 2 to the other contact of the switch with change-over contact.

Arrow points to switch with change-over contact.

By fitting the switch with change-over contact in the front panel of the motortester, it is possible to switch over from standard ignition systems to those with current limitation. We recommend that the switch positions be marked correspondingly:
e.g. "Standard" - "Current limitation".
These conversion measures have already been published in the K7 information sheet KJF 28/7911.

4. Test instructions

4.1 Standard ignition systems
Switch position: "Standard".
All other tester connections as per operating instructions.

4.2 Ignition systems with current limitation
Switch position: "Current limitation".
In order to trigger the timing strobe, the inducation-type pulse generator (clamp-on pickup or rod pickup) must always be connected during the measurement.

The selector switch for ignition systems built into the motortester must be switched to standard coil ignition (not to TCI) with these ignition systems.

All other tester connections as per operating instructions.

The dwell angle is electronically controlled. A measurement of the dwell angle is no longer performed.

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TESTS ON ELECTRONIC IGNITION SYSTEMS (TCI, TI)
TESTER INSTRUCTIONS

VDT-I-Gen. 035 En
03.1981

The following tests are listed in older and current Tester operating instructions or in "Trouble-shooting with the oscilloscope":

* "Separate ignition coil test"
  (Concerns EFAW 213, 214, 268, AE 2000)

* Calculating the "ignition voltage reserve"
  (Concerns EFAW 213, 214, 268, AE 2000 and MOT series).

* "Intensified insulation test"
  (Concerns EFAW 213, 214, 268, AE 2000 and MOT series).

Nowadays, transistorized ignition systems deliver more than 30,000 V secondary voltage.

To avoid damage to ingition coil, ignition cable and ignition distributor by voltage flashovers, the tests listed above should n o t be carried out on transistorized ignition systems.
The contents of this Service Information has already been published in the K7 Information K7-VJF 17/8012.

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